Supporting Personal Digital Storytelling: From People to Software

Brian M. Landry, Mark Guzdial
GVU Center
College of Computing
Georgia Institute of Technology
801 Atlantic Drive, Atlanta, GA 30332
{blandry, guzdial}@cc.gatech.edu

ABSTRACT
Everyone has a personal story to tell. Often these stories are captured in the photos and videos we take to remember and share our experiences. Through a study of the Center for Digital Storytelling's workshops, we discovered telling personal stories using digital media captured during the experience requires more support than current software tools provide. We present a set of guidelines for supporting digital storytelling and strategies to implement each. We use the guidelines to assess the support a current software solution (Apple Computer's *iLife* series) provides. From our analysis we identify supports needed for personal digital storytelling that are absent in tools today and provide suggestions for providing those missing supports.

Author Keywords
Personal Digital Storytelling, Field Study, Digital Media

ACM Classification Keywords

INTRODUCTION
Most digital cameras allow users to capture a range of media including still photos, video and audio at impressive resolutions. People are taking more and more pictures and video often for mostly personal reasons. People capture media to remember and share personal experiences [4,10, 19, 23].

Extensive work has gone into improving organization and retrieval of media assets from digital media collections [1,5,15,22]. The challenge for most people, however, is in telling their stories with these media. Their secondary school composition courses may have helped with telling stories in text, but do not really help with digital media. Users of digital cameras want to know how to support the use of digital media collections to create compelling artifacts that effectively communicate personal experiences. A number of software packages [3, 2, 14] allow users to create simple artifacts with their personal digital media (e.g. slideshows, calendars, photo albums). These artifacts focus more on providing an accurate account of an experience, not telling a *story* [18].

We are interested in determining what barriers exist, in currently available tools, to the creation of digital stories that convey the experience captured in the media. We start by considering how *people* can support this process and consider how software can provide similar supports.

The Center for Digital Storytelling (CDS) in Berkeley, CA, teaches the skill of producing stories about personal experiences using the digital media captured during the experience. They hold workshops in which wide ranges of users create movies that tell their personal stories. We believe that the response to the CDS workshops and to the artifacts produced in those workshops suggests that they do have a process that leads to the kind of experience and product that users find interesting. As such, we explore what goes on in the CDS workshops and how it can be captured and replicated in software.

To better understand what it takes to produce a personal story with digital media, we observed two of the CDS workshops. From our qualitative observations of this workshop, we have developed a set of guidelines we believe are essential to making digital media production accessible to novice users. In the next section we review the digital storytelling process through the CDS lens. We present a study we conducted at two different CDS workshops and what we learned in the form of guidelines that describe the support that the CDS workshops provided to enable their participants to create digital stories.

The next question is how well existing software provides the same support. We chose the Apple *iLife* package as a particularly rich and novice-friendly toolset in combination with a "how to" manual for helping users learning *iLife* to determine whether we can find the same supports found in the CDS workshops. To explore what is missing, we compare *iLife* to the guidelines we constructed from

observing the CDS workshops to identify potential opportunities for improvement. In the final section of this paper, we suggest possible technologies for filling the gap in support for digital storytelling.

DIGITAL STORYTELLING DEFINED

For our purposes of exploring personal storytelling through digital media, we have adopted the CDS form. Digital stories are 3-5 minute movies consisting of the author's images and video coordinated with a voiceover to tell a story. The story is enhanced using a soundtrack and image pan and zoom effects.

To more clearly define our perception of digital storytelling, we explore *MOMNOTMOM* - an example digital story available on the CDS website [9]. The story begins focused on a picture of a young lady looking off into the distance at a scenic landscape. The author begins to tell the story in her own voice saying:

"There's a picture of my mother that I always keep with me. It's a curious photo, because in most photos, I always imagine that people pose for the future, but in this time [pause], this moment [pause], this photograph [pause], I feel like my mom is searching for her past."

As the author speaks, a guitar plays softly in the background while the viewer is slowly zoomed into the photo past the young lady into the landscape. The combination of voice, imagery, motion and soundtrack make for a compelling presentation of the author's story. Although a story could be presented using digital media in a number of ways (e.g. documentary, full length film, etc.), this particular form presents itself as a tractable, engaging and seemingly popular form for the average person to use for telling stories using their media. CDS provides support for creating this type of story through a workshop. To understand how users are helped with telling their story using digital media, we conducted a study of CDS's digital storytelling workshop. In the next section we provide more details about the workshop.

CENTER FOR DIGITAL STORYTELLING WORKSHOP

The Center for Digital Storytelling is an organization "…dedicated to assisting people in using digital media to tell meaningful stories from their lives."[9] The Digital Storytelling Workshop is one vehicle for accomplishing this mission. Typically between 8 and 15 people from different walks of life over the course of three days engage in roundtable discussions, creative writing, software tutorials, digital image manipulation and movie production with the goal of authoring a 3-5 minute digital movie.

The Digital Storytelling Workshop begins with each participant giving a brief personal introduction and preview of the story they hope to tell. A workshop facilitator then gives a lecture on the seven elements [16] that define a digital story according to CDS using previously created stories as illustrations. Those elements include having a particular point of view, working from a dramatic question, using a voiceover, and including a soundtrack.

The workshop then continues with the "story circle" in which participants share their concept for the digital story they want to create. As each person tells their story to the group, the other participants are encouraged to give feedback and attempt to answer questions the participant currently sharing may have. The story circle fosters a sense of community, which plays a major role in the cultivation of each story.

With the feedback provided in the story circle, the participants begin developing their scripts. The final version of the script will serve as the voiceover for the digital story. Once a rough draft is produced, the workshop facilitators review each participant's draft individually and give suggestions on how the quality of the story could be improved (e.g. by reorganizing the order in which the story is told). Once the script has been finalized, the participants go into a separate room and record their voiceover. In conjunction with the writing process, participants are given tutorials of the software tools they will use to create their stories.

Participants are not required to have previous experience with digital media editing or computers at all. Tutorials are provided to teach the participants the skills they will need to produce their digital story. The participants are introduced to Photoshop Elements and then begin importing their digital photos. They touch up the photos and think about what types of compositions they could create from their photos for use in their story.

The participants are also given a tutorial on producing their story in Adobe Premiere. Once their content is ready, they begin creating a "rough edit" of their story. The voiceover is placed on the timeline first, and then photos, and in some cases video clips are placed on the timeline and synchronized with the voiceover. Once all the content has been arranged, the participant and a workshop facilitator review the "rough edit" and consider how the story could be further improved. Once the content is finalized on the timeline, transitions and effects are added and a title screen and a soundtrack are used to enhance the story. At the end of the workshop, a final viewing is held to allow the participants to see each other's work. Following the workshop, the CDS staff polishes each story by removing glitches (e.g. broken transitions) and adding effects that the participant intended to add before the workshop ended. The final version of each story is exported to a portable storage medium and mailed to the participant.

STUDYING HOW PERSONAL SUPPORT WORKS

The CDS workshop enables people to create meaningful personal stories using their personal digital media. To uncover the factors that influence the successful completion of a digital story to make this process more accessible to everyday computer users, we conducted a field study of the

CDS Digital Storytelling Workshop. We were interested in learning the following:

- Participants familiarity with various digital media editing tools (e.g. Adobe Photoshop and Premiere, iPhoto, iMovie)
- Participants digital media sharing habits (e.g. creating digital photo albums) prior to the workshop.
- Where people fail in the digital story creation process and the type of support that helps them through the failure.

We surveyed and observed a total of 18 people in two separate workshops held in June & July 2004. We used questionnaires to gather demographic information and assess the technical and digital media composition experience level of the participants. At the beginning of each workshop participants completed surveys including questions about their level of computer experience and access to computers and media capture devices (e.g. video camera). We also asked participants about their familiarity with popular image and video editing tools (e.g. Abobe Photoshop and Premiere) and any difficulties they experienced when using them. To assess personal media sharing habits, we asked users who had created an album containing photos or videos to explain why they created them and with whom they shared them. Finally, we suspected that the writing habits of participants might have an affect on how well they would navigate the script writing process and also their ability to repeat the process at home when they attempt to create another digital story.

Quantitative Findings

Participants came from a number of different backgrounds (e.g. sales and product management); however, most participants were educators. The workshops were largely female (13 females, 5 males). From the questionnaires we found:

- Twelve of the 18 participants reported having access to a digital camera.
- Five of 12 who have access to a digital camera consider themselves to be avid photographers.
- Eight of the participants reported having shared their media by creating some type of digital artifact. The artifacts typically took the form of either pictures shared in an online album or PowerPoint slide shows.
- Seven of the 18 participants had previous experience with Adobe Photoshop and only two with Adobe Premiere. This shows that prior to the workshop, participants were largely unfamiliar with the tools they used to create their digital story.
- Participants brought more writing experience to the workshop than we expected. Slightly less than 50% of the participants engaged in writing (excluding email) of some form more than twice a month. However, in some cases the experience was due to the requirements of the participant's occupation and not personal reasons.

These findings suggest a number of things. First, people do indeed have access to digital cameras and are taking pictures. People seem to be creating simple artifacts using their media; however, they do not seem to cross over into movie production. It is not clear to us why, but we suspect that lack of access and difficulties using current digital media editing tools as suggested by participants are major reasons. We now discuss our qualitative findings, which provide more insight into this issue.

Qualitative Findings

In addition to surveys, we observed and interacted with participants to get a sense of when people need support and how it is provided. While observing and interacting with participants, we saw a few different classes of challenges emerge. We now discuss those in detail and how the CDS staff helped participants overcome them.

Challenges in Writing

The workshop began with a description of the digital storytelling form endorsed by CDS. It's important to note that the basic elements of the artifact had already been pre-determined by the CDS staff by that point—the participants would not be preparing a video game, for example, to tell their story. We think providing a story model helped participants organize their thoughts about their story. At the very least, it provided a starting point for the participants rather than requiring them to define the starting point for themselves. Also, to help users gain a clear understanding of how to implement the form, completed digital stories were analyzed to demonstrate intended usage.

While predefining the form may have given the participants somewhat of a head start, participants still ran into a number of obstacles. Many found it difficult to choose a specific issue as the focus of their story. Many aspects of a particular experience could be interesting to share in a digital story, however with only 3-5 minutes, focus is important. Feedback from the story circle and individual feedback from workshop facilitators helped students in this regard. Participants often provided each other with useful ideas and comments, while the facilitators provided more detailed guidance (e.g. they helped students effectively organize their story)

Similarly, some participants found it difficult to write within the one page script limit. The haiku was used as a metaphor to describe the level of conciseness participants should aim for when writing their scripts. This was not implemented as a strict guideline, but provides a useful

analogy. Typically workshop facilitators provided participants with individual feedback to achieve this.

Challenges in Content Preparation

The tools participants used to prepare their content were introduced early in the workshop to give participants a sense of what is possible to create while still working on their scripts. Participants were guided through basic image manipulation tasks such as resizing, cropping and photo touch up using Adobe Photoshop Elements. A specific set of tools (e.g. lasso, clone stamp, etc.) and only those tools were demonstrated for accomplishing these tasks. This minimalist approach to teaching Photoshop Elements allowed participants to focus more on their story and less on figuring out the tools. One participant commented on Adobe Photoshop:

"There are so many options I don't think anyone truly knows everything. I have had Photoshop for 2 year[s] and struggle with it daily"

Participants also struggled with importing their content from their devices and older non-digital storage media (e.g. videocassette). Participants needed assistance with connecting and transferring their content from their devices or other media to their workstation computer. The workshop facilitators often performed these tasks for the participants. One participant described his frustration with importing content in terms of his previous experience with video editing:

"I dabbled with videos on my PC but was very frustrated by inability to import video and then once I produced something and created an output file, I couldn't get any other PC to recognize the format."

In addition to performing difficult tasks for participants, the CDS staff used heuristics to provide answers to common questions. For example, a number of participants had questions about the appropriate image format to use when they saved edited images (the Photoshop Document (PSD) format was specified as the format to use). Heuristics were also provided to help participants avoid beginner's mistakes. For example, participants were instructed to record their script in segments to reduce the amount of re-recording needed to correct errors.

We found preparing content for a digital story to be a time consuming process. Participants spent close to a day of the workshop performing the same manipulations repeatedly to each of their images. One participant complained that she wished she could do all of the image manipulations she needed for each photo all at once rather than doing the same manipulations for each photo. Surprisingly, no suggestions or tools are given for making this process easier. The relatively short length of the movie may serve as an explanation for this.

Challenges in Movie Production

During the production of the movie we found participants struggled with the use of Premiere as well as the implementation of the story elements that related to visual portion of the story (e.g. economic use of images and pacing). Participants needed help with importing their images and adding transitions to their movies. By far, students required the most assistance with adding effects to their movies. As with the content preparation challenges, individual assistance was provided to handle these issues.

Heuristics were again used to aid students, this time with the visual design of their story. When selecting photos for their story, participants were advised to use a particularly good photo to represent an idea, rather than flipping through a number of similar photos to convey the same concept. They were also cautioned to use soundtrack and effects sparingly as they do not make the story.

Challenges in Completion

We found that the challenges to completion involved managing the process, getting past frustration with tools and overcoming the fear of incompletion. Communal support played a central part in participants being able to complete their projects. Participants served as sounding boards as well as technical and emotional support for one other. In one workshop, the group gave the first person to record their voiceover encouragement as she left the room.

Workshop facilitators provided more structured support to help participants overcome the challenges to completion. An important aspect to taking on personal digital storytelling is careful management of time and process. CDS defined the process for creating a digital story for participants to follow. Deadlines were set for completing each stage of the workshop and a whiteboard was used to track the progress of each participant. To help participants take an organized approach to storing their content in the file system, CDS provided a directory structure using descriptive names related to the process of creating a digital story (e.g. soundtrack, resized, etc.), which participants simply cloned and used to manage their project content.

Facilitators ensured that participants finished the process by the end of day 3 by monitoring their progress and taking over to finish the project with the direction of the participant in extreme cases. In addition, they polish the movies after the workshop ends, export them to a portable storage medium and ship them to the participants.

Through observing these classes of challenges and how the CDS staff responded, we developed a set of guidelines to inform developing support tools for personal digital storytelling.

SUPPORT GUIDELINES

From our observations at the CDS workshop we developed a set of guidelines useful for relating the supports necessary to enable successful personal digital storytelling. These guidelines deal with the difficulties participants

encountered both with software and the storytelling process. We now describe them in detail citing strategies for employing each.

Guideline 1: Provide pre-defined story models and examples of effective use

To help participants understand the digital storytelling form adopted by CDS, workshop facilitators provided a description of the form (the seven elements) and used examples of the form to illustrate a successful implementation of it. Providing participants with examples gave them models to reference when working on their own stories. Models also served as a point of departure for their storytelling endeavor.

Support Guideline	CDS Support Approach
Guideline 1: Provide pre-defined story models and examples of effective use	Pre-define the target form and teach the usage of the form Use successful examples to demonstrate appropriate use of the form
Guideline 2: Provide a pre-defined toolset for realizing a particular story form and examples of effective use	Pre-determine the toolset needed to effectively implement the selected story form Use tutorials to demonstrate the usage of the toolset and provide practice opportunities
Guideline 3: Use feedback to increase story quality and eliminate software barriers	Encourage storytellers to form a community in which feedback and support can be obtained. Provide access to expert digital storytellers for help with story development and tool use
Guideline 4: Reduce set backs due to issues not vital to producing a quality digital story	Perform file organization for the participant Provide content import support Polish stories through post production Provide heuristics for potential issues and issues that arise in the process
Guideline 5: Clearly define and manage the user's process in terms of progress, time and emotion	Pre-define the steps to creating a digital story Set goals and deadlines for each phase of the process Track each participant's progress

Table 1: CDS strategies for digital storytelling

Based on these observations, we consider the following strategies useful for implementing this guideline.

- Define the story form and its components in advance
- Demonstrate the usage of the form with visual and written examples

By providing a blueprint, users spend less time thinking about how to approach writing and more time writing. Successful examples provide users the opportunity to observe the form in use as opposed to proceeding with just a description.

Guideline 2: Provide a pre-defined toolset for realizing a particular story form and examples of effective use

Models for understanding how software tools work are essential to effective and appropriate use. We find the use of the following strategies in the workshop enabled the creation of compelling stories while minimizing difficulty with tools.

- Define a limited toolset for implementing a story form
- Provide tutorials of the toolset and define appropriate usage scenarios
- Provide toolset practice opportunities

A limited toolset as we discovered in our field study focuses the user on preparing their content rather than exploring the tools a software package has to offer. Demonstration and practice of a limited toolset not only familiarizes participants with the tools but it develops a sense of what is possible to design. Also, understanding when the use of a particular tool is appropriate to a desired action is also necessary to convey to users.

Guideline 3: Use feedback to increase story quality and eliminate software barriers

Over the course of the workshop, participants received feedback from one another and facilitators at each stage of the process. Feedback is useful for story development and difficulties encountered with technology. The story circle was particularly successful at providing each participant with targeted feedback and suggestions for improving their story. Facilitators also provided participants with individual attention during the scripting, content preparation, and production processes. This type of rich individual and communal interaction is vital to improving story quality. The following strategies are useful in providing feedback to users:

- Connect users with a support network of peer digital storytellers.
- Connect users either directly with experts or expert suggestions and recommendations.

By employing these strategies, users can increase their story's quality through access to feedback on critical issues.

Guideline 4: Reduce set backs due to issues not vital to producing a quality digital story

There were a few tasks that the CDS staff handled on behalf of participants. None of these tasks were essential to improving story quality, but either made the process more navigable or added a finished touch to the story. In the context of digital storytelling, the following strategies are useful:

- Abstract content organization to a more manageable level
- Simplify the transfer of content from the capture device to the computer
- Fine tune the user's final cut of the movie (post production)
- Provide a list of heuristics for navigating each stage of the storytelling process

We noticed participants had difficulties with interacting with the file system. Part of the difficulty was unfamiliarity with the Macintosh OS X interface. However, the more salient problem was maintaining the link between the objects (e.g. images, soundtrack, etc.) being manipulated and their location in the file system. This problem was remedied in the workshop through the provision of a directory structure tailored to the digital storytelling process.

Another issue we observed was with transferring content from a camera or an analog storage medium (e.g. VHS) to the computer. Participants who brought their pictures and video on cameras or other storage media (e.g. Beta Max) needed assistance in many cases just to connect the devices and import the desired content from the device to the computer and then into the target application.

Even though students created some very interesting pieces, we saw many cases where some fine-tuning was required to remove glitches in transitions and effects for example. After the workshop, the CDS staff polished and made final adjustments to each participant's video following the workshop.

In many fields, experts develop a set of "tricks" to help them become more efficient practitioners in their field. Novices and casual users who do not have this level of practical experience with image manipulation and video editing tools may never develop these due to infrequent use. However providing heuristics for users to consult when performing certain tasks could help users avoid making common mistakes. In the workshop, a number of heuristics were provided to help participants overcome difficulty. For example, participants were advised to scan as many photos as possible at once and separate them using Photoshop Elements rather than scanning each photo separately. Heuristics prevented trivial issues from sidetracking participants.

Guideline 5: Clearly define and manage the user's process in terms of progress, time and emotion

Workshop facilitators managed all aspects of the process and time for the participants. While the participants may have been aware of time constraints, it was the facilitators that defined the process, set goals, and monitored the progress of the participants. The following strategies are useful in helping users manage time and process:

- Set a completion deadline
- Clearly define the different parts of the process
- Set goals for each part of the process
- Monitor the user's progress
- Provide encouragement for making progress

Finding time to complete a digital story outside of the workshop is clearly an issue. The limited duration of the workshop served as a forcing function for participants while providing them the opportunity to focus solely on creating their story. While these strategies can assist the user, the user will have to be self-motivated to stay the course.

PROVIDING THE SUPPORT IN SOFTWARE

Based on our field study, we believe that the workshop participants *liked* what they created—the workshop was successful in helping people produce a quality personal story from digital media. Several participants mentioned plans to continue working on their story following the workshop. One participant told us that she wanted to create a video for each of her children (her story was about her son). While a few were confident that they could repeat the process, many found the process to be more difficult than they anticipated. One participant described the experience as "nerve wrecking."

In conversations with workshop facilitators, we discovered their belief that people will still need support when they attempt to repeat the process alone. We believe that people would find it much more difficult to repeat this process without the same level of support. The guidelines we have presented based on our field study touch on many of the tenets of User Centered Design -- in particular the importance of understanding the user's task and designing to support that task. We have found that many tools provide the functionality needed to create a great movie, but do not assist the user in the process of doing so. We now discuss this in more detail.

We explored a number of tools to determine whether the tools available would provide enough support for software and storytelling. While we found that many tools do not provide some key supports for digital storytelling, in the process we discovered that the combination of a "how-to" manual paired with a set of tightly integrated tools could possibly provide a significant amount of the support needed for creating digital stories.

One particular suite of applications that seems to be close to making digital storytelling accessible to the average computer user is the iLife software package from Apple Computer. iLife includes tools for managing and editing photographs (iPhoto), and creating movies from video and still images (iMovie). During our exploration of the offerings of iLife, we discovered *The Macintosh iLife '04* [13] by Jim Heid, which is a text resource with a DVD on learning to use iLife. We wonder if combining this resource with the iLife series could provide the necessary amount of support for creating movies.

In this section we explore how Apple's iLife series paired with Jim Heid's text compares to the identified support elements provided in the digital storytelling workshop that enable successful digital storytelling. We will examine Apple's iLife in the context of each guideline to determine how well it provides support. In particular we focus on iPhoto and iMovie because they are equivalent in purpose to Photoshop Elements and Premiere. We could have chosen a number of applications to perform this analysis (e.g. [21]); however, the tight integration and user-friendliness of the applications in the iLife suite make it a more viable candidate for replicating the support provided in the CDS workshop.

Guideline 1: Provide pre-defined story models and examples of effective use

This guideline encourages defining models for developing digital stories and using examples to demonstrate the form. CDS does this through walkthroughs of examples and through provision of a written reference (i.e. a digital storytelling cookbook) to provide guidance [17].

Heid's text paired with the iLife suite provides very little of this experience. While Heid provides step-by-step instructions for accomplishing common tasks in the movie production process, little space is devoted to developing a story in the context of media. Heid provides a crash course on how to complete processes related to iLife applications (e.g. importing video from a camera) but leaves the linking of story to media for the reader to negotiate.

While Heid's text may decrease the learning curve for iMovie, implementing a story is not any simpler. Because iMovie is a general-purpose movie-editing tool, users can create a movie in many different forms (e.g. digital story, slideshow, etc.) and on many different scales (e.g. short story to full length film). While this makes the tool more flexible, it is the same flexibility that decreases its usability. Without a good concept of the story, it is difficult to develop a good movie or digital story [20].

By starting the workshop with a discussion of story ideas and creative writing, participants were able to develop a sense of direction before using Photoshop and Premiere. When the user no longer has human support, what will serve as the catalyst for defining the story?

We might charge this responsibility to our tools. Current software tools do not invite users to seriously think about the story they wish to tell, but instead allow them to engage in the creation process without a clear sense of purpose. Tools for digital storytelling should not only enable us to manipulate our media, but also support the reason we choose to manipulate our media in the first place.

Guideline 2: Provide a pre-defined toolset for realizing a particular story form and examples of effective use

CDS defines the needed toolset for creating a digital story and provides tutorials for the needed tools. Carroll and Carrithers [7] discuss the usage of "training wheels" in a user interface to help users become productive using a new interface by limiting their options to only those tools needed initially. Similarly, digital storytellers should be equipped with just the set of tools needed to produce a quality story. We find that the iMovie and iPhoto interfaces provide a reasonable number of tools to complete the digital storytelling process without overwhelming the user with options.

Support Guideline	Software + Manual Approach
Guideline 1: Provide pre-defined story models and examples of effective use	No support provided for story models
Guideline 2: Provide a pre-defined toolset for realizing a particular story form and examples of effective use	Pre-define sufficient toolset Explain toolset usage using written and visual examples Provide Tutorials
Guideline 3: Use feedback to increase story quality and eliminate software barriers	Provide expert demonstrations of common tasks Lacks access to live feedback
Guideline 4: Reduce set backs due to issues not vital to producing a quality digital story	Perform file organization for the user Provide content import support within application Provide heuristics in anticipation of questions
Guideline 5: Clearly define and manage the user's process in terms of progress, time and emotion	Pre-define the sequence for making a movie Lacks fine grained management of process

Table 2: Software + Manual Resource strategies for digital storytelling

To help them navigate the interfaces, novice users are provided with demonstrations and tips for using the functions of iPhoto and iMovie. Heid explains the use of each element in the interface along with references to the included DVD when video demonstrations of topics are

available. For processes related to various iLife applications (e.g. importing video from a camera), Heid provides walkthroughs for completing those processes. For example, in the iMovie section of the book, the basics of recording good sound are presented for a number of different scenarios.

Guideline 3: Use feedback to increase story quality and reduce software barriers

While creating a digital story is largely an individual task, the process at least in the context of the CDS workshop is largely collaborative. Constructive feedback elevates digital story quality. Just as we (researchers) seek feedback from others in our field to improve our own work, it is essential that digital storytellers acquire feedback from other digital storytellers to improve their story and sharpen their digital storytelling skills. Heid's text provides this support in a somewhat limited form through suggestions and step-by-step instructions for accomplishing common tasks (e.g. cropping a photo). In some instances a reference to the included DVD is provided so users can watch an expert demonstrate the task. Unfortunately, it is not possible in this configuration to ask questions and get feedback on issues not covered in the text. While it may be possible to create digital stories without feedback, the quality of the story could diminish significantly without it.

Guideline 4: Reduce set backs due to issues not vital to producing a quality digital story

iMovie and iPhoto are particularly good at masking the details of the application that do not assist the users in reaching their goals. Rather than have users deal with file organization at the file system level, users only work with abstract objects to accomplish tasks. For example, photos imported into iPhoto are displayed as thumbnails and are used for viewing, editing and performing organization tasks. The user never has to access the actual file system and in fact, Heid discourages accessing the iPhoto Library file system folder altogether. Similarly, iMovie uses clips as abstractions for users to create their movies. Users are not required to save edited versions of clips as this is all managed by the application. Also the tight coupling of the iLife tools (iMovie, iPhoto and iTunes in particular) allows users to apply the concepts used in one application in another application. For example, instead of accessing the file system to import photos into iMovie, users can access their iPhoto albums from within iMovie. Likewise, they can access their iTunes Library and playlists to add music to their movie.

There were many questions in the workshop that were answered by providing participants with "rules of thumb." This type of knowledge is gained through practical experience. Heid's text and DVD provide users with tips and written explanations of the tools along with visual demonstrations of how to perform common tasks. The book is also filled with tips for taking effective video and pictures.

Guideline 5: Clearly define and manage the user's process in terms of progress, time and emotion

Frohlich et. al. [11] discovered that people considered creating photo albums of pictures complex and time consuming. We find from our observations that the same is true for the process of creating a digital story. In the workshop, effective time and process management contributed to the participants' successful completion of their story. Management of the process is very important and is evidenced by one participant's comment on their difficulty with software tools: "*[the] interface [is] not clearly related to [the] process*." The iLife suite along with other tools provide users with great features for completing a task, but they leave the process to users with little or no experience in this regard to figure out. The workshop facilitators were effective at managing time, making the process clear and ensuring that users complete the process. Media composition tools should provide this same type of support.

CONCLUSION: WHAT THE SOFTWARE DOES NOT PROVIDE, AND HOW IT MIGHT

We have presented a study of a personal digital storytelling activity and support guidelines for making digital storytelling happen. We have also explored a particular software package to understand what is missing in software solutions that is provided in the human solution (CDS workshop). We now go into more detail on what software does not provide and how it might achieve a level of support similar to the CDS workshop.

An essential part of the digital storytelling process absent in existing software tools is feedback for improving the story. We suggest the integration of collaborative (e.g. collaborative websites) and communication tools (e.g. blogs) into digital storytelling software to allow users to collaborate and get feedback during the creation process. Minimally, users could be provided with guidance through pre-defined lists of recommendations and suggestions from the experts to provide quick answers to common questions.

An activity participants benefited from but were not directly involved with was time and process management. This type of support is lacking in tools and we suggest a few ways to mange time and the digital storytelling process for the user. One possibility is the addition of a tracking component to take the place of the CDS workshop facilitators. This component would set deadlines for the user (which of course could be adjusted by the user) and periodically provide an assessment of the user's progress. While this approach may not serve as the forcing function the 3-day workshop provided, we think increasing the user's awareness of their progress could be useful. Another way to help users manage the process is by using a timeline to provide a visual cue about the amount of work left to complete before the deadline. Suggestions could be made to help the user make progress. Users could also be motivated through friendly competition by including a display indicating the progress of fellow digital storytellers.

The CDS workshop pays a great deal of attention to development of each participant's story before they begin manipulating digital content. After all, what is a digital story without a story? As we mentioned earlier, tools do not encourage forethought about story. Writing should become part of the user's concept of the storytelling process. We suggest integrating story development into the process of producing personal digital stories. Users could even be supplied with models or templates as starting points for developing scripts similar to the way CDS provided participants with a form to model. While storyboarding tools could serve this purpose, we have found such tools to be too involved especially for a 3-5 minute movie.

Digital storytelling is on the path to becoming a widely used form of expression. Communities of digital storytellers already exist [24, 6] and are continually growing. Filling the gap in support to allow users to move from creation of simple artifacts to manageable production of engaging stories is necessary to give users access to this desired form of expression.

ACKNOWLEDGMENTS

We thank Joe Lambert and Emily Paulos at the Center for Digital storytelling for the opportunity to observe their process and interact with workshop participants.

REFERENCES

1. Abowd, G.D., Gauger M. and Lachenmann, A. The Family Video Archive: An annotation and browsing environment for home movies. In *Proc MMIR 2003*, ACM Press(2003), 1-8.
2. Adobe Photoshop Album. http://www.adobe.com/products/photoshopalbum/main.html
3. Apple iLife. http://www.apple.com/ilife/.
4. Balabanovic, M., Chu, L.L. and Wolff, G.J. Storytelling with Digital Photographs. In *Proc CHI 2000*, ACM Press(2000), 564-571.
5. Bederson, B.B. PhotoMesa: A Zoomable Image Browser Using Quantum Treemaps and Bubblemaps. In *Proc. UIST 2001*, ACM Press(2001).
6. Capture Wales Digital Storytelling. http://www.bbc.co.uk/wales/capturewales/
7. Carroll, J.M. and Carrithers, C. Training wheels in a user interface. *Communications of the ACM*. 27(8): 800-806.
8. Catrambone, R. and Carroll, J.M. Learning a word processing system with training wheels and guided exploration. In *Proc. CHI 1996*, ACM Press(1996), 169-174.
9. Center for Digital Storytelling, http://www.storycenter.org.
10. Frohlich, D. and R. Murphy, The Memory Box. Personal and Ubiquitous Computing, 2000. 4(4): p. 238-240.
11. Frohlich, D., Kuchinsky, A., Pering, C., Don, A., Ariss, S. Requirements for Photoware. In *Proc. CSCW2002*, ACM Press(2002), 166-175.
12. Guzdial, M., Rick, J. and Kerimbaev, B. Recognizing and Supporting Roles in CSCW. In *Proc CSCW 2000,* ACM Press(2000)
13. Heid, Jim. The Macintosh iLife '04. Berkeley, CA: Peachpit Press., 2004.
14. Jasc Paint Shop Photo Album. http://www.jasc.com/products/photoalbum/.
15. Kuchinsky, A., Pering, C., Creech, M., Freeze, D., Serra, B., Gwizdka, J. FotoFile: A Consumer Multimedia Organization and Retrieval System. In *Proc. CHI 1999*, ACM Press(1999), 496-503.
16. Lambert, Joe. *Digital Storytelling, Capturing Lives, Creating Community*. Berkeley, CA: Digital Diner Press., 2002.
17. Lambert, Joe. *Digital Storytelling Cookbook and Traveling Companion*. Berkeley, CA: Digital Diner Press., 2003.
18. Laurel, Brenda. *Computers As Theatre*. Boston, MA: Addison-Wesley., 1993.
19. Makela, A., et al. Joking, storytelling, artsharing, expressing affection: A field trial of how children and their social network communicate with digital images in leisure time. In *Proc. CHI 2000*, ACM Press(2000), 548-555.
20. Collier, Maxie. D. *The iFilm Digital Video Filmmaker's Handbook*. Lone Eagle Publishing, 2001.
21. Microsoft Plus! Photo Story 2. http://www.microsoft.com/windows/plus/dme/photo.asp
22. Rodden, K. and Wood, K.R. How Do People Manage Their Digital Photographs? In *Proc. CHI 2003,* ACM Press(2003), 409-416.
23. Stevens, M., Abowd, G., Truong, K., Vollmer, F. Getting into the Living Memory Box: Family archives & holistic design. *Personal Ubiquitous Computing*, 2003. 7(3-4): 210-216.
24. Third World Majority. http://www.cultureisaweapon.org/stories/mainframe.php3